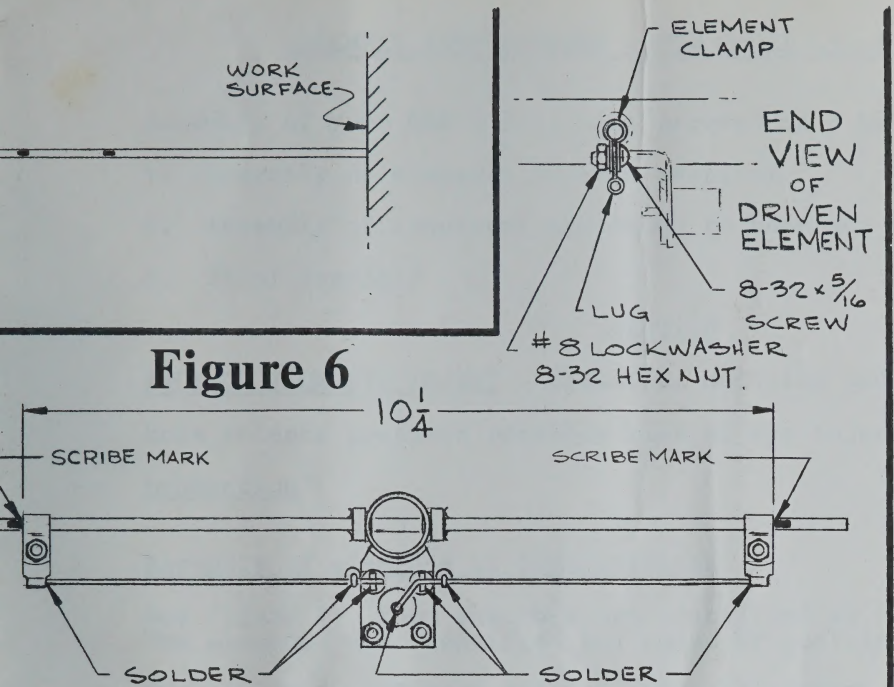

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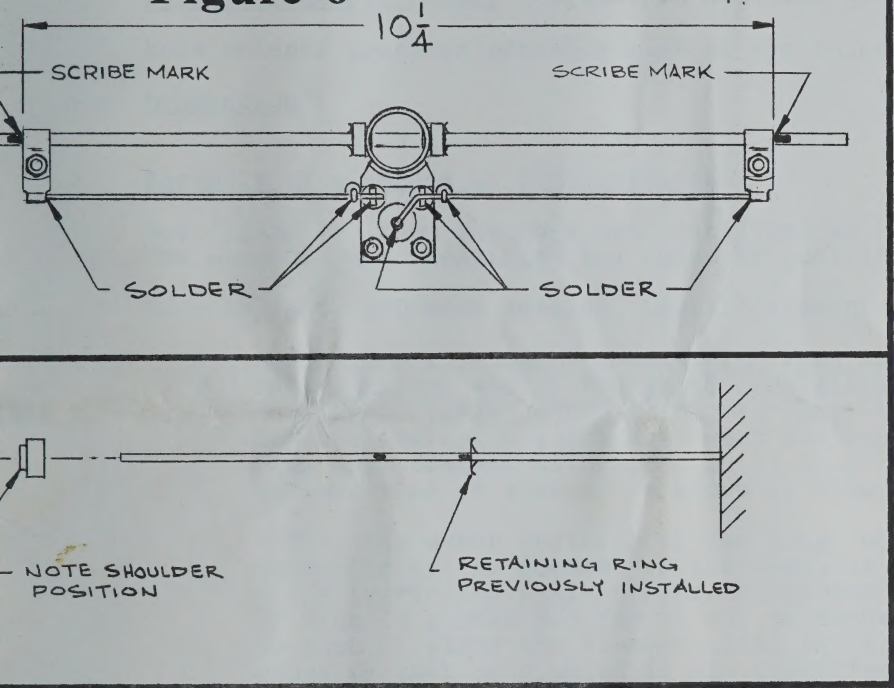

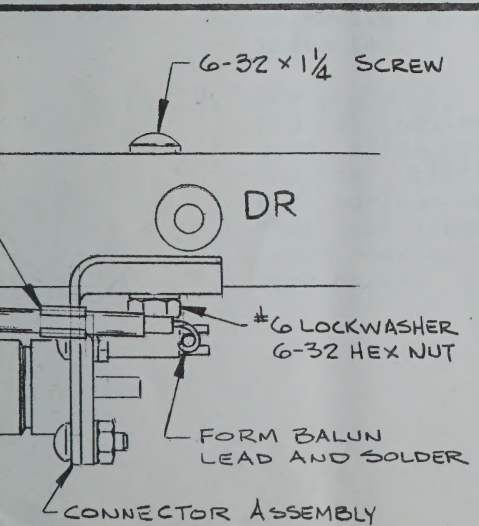

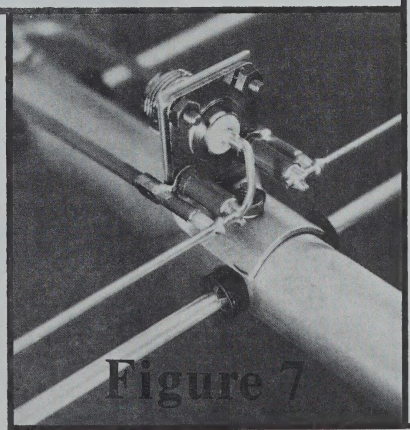

Figure 7

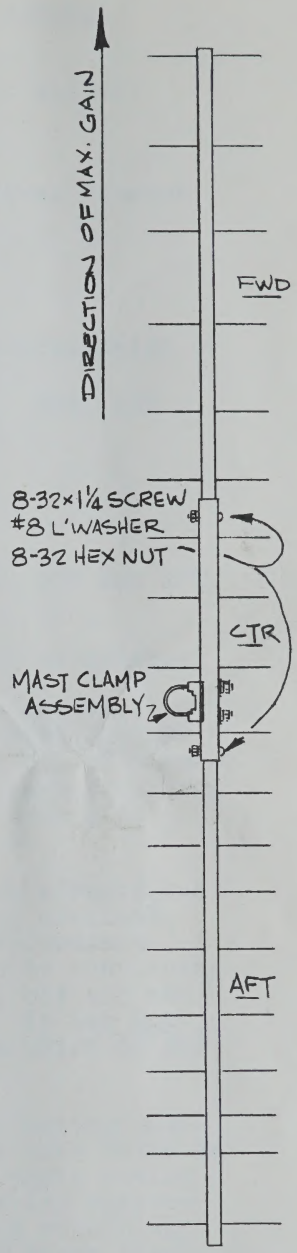

Figure 8

RIW 432-19

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ASSEMBLY INSTRUCTIONS - RIW MODEL 432-19 ANTENNA

Assembly of your RIW 432-19 will proceed in 3 basic stages:

1. Assembly of elements to boom sections
2. Assembly of connector and balun to boom and driven element
3. Final assembly

CAUTION

PROTECT FROM EYE INJURY - Assembly, handling and installation of this antenna presents possible risk of eye injury. Wear eye protection!

Assembly of elements to boom sections

See figure 1. Boom sections are identified as FWD, CTR and AFT. The elements are identified and coded by position.

Starting with FWD boom section, install element D16 as follows:

A. See figure 2. Insert a retaining ring into the shallow recess at the end of the spool - RETAINING RING FINGERS MUST POINT TOWARD SPOOL as shown. With one tip of element bearing against a stationary work surface, push retaining ring onto element with spool until ring is even with scribed line on element as shown in figure 3.

   NOTE: The exact position of the ring, which effects the centering of the element on the boom, is not critical; ± 1/8" variation will not effect antenna performance. If ring is pushed too far it may be removed by continuing to push it along the element until it falls off the end opposite that onto which it was installed. It can not be removed by pushing back towards end from which it was installed.

B. See figure 4. Slide insulator onto element noting position of insulator shoulder. Insert element thru holes in boom, slide second insulator onto element, again noting shoulder position. With tip of element bearing against work surface as shown in figure, push second retaining ring onto element until it presses firmly against insulator, making sure that insulators are properly seated in boom holes.

Assembly of elements to boom sections (cont.)

Repeat previous steps A and B for remaining elements in all boom sections.

ASSEMBLY HINT: Holding the boom section horizontally and bearing element tip against a slender vertical surface such as a door jamb or column has been found very convenient as it allows clearance for elements already assembled.

Assembly of connector and balun to boom and driven element

A. See figure 5. Secure the connector assembly to the AFT boom section noting that connector faces forward. Insert ends of balun thru lugs on connector assembly and slide into position shown, securing balun to boom with plastic clamp.

B. See figure 6. Assemble element clamps and lugs to the driven element. Lugs are to fit between clamp tabs. Secure clamp hardware very tightly. Note that scribe marks have been placed on the element at the specified 10¼" clamp spacing.

C. See figures 5, 6 and 7. Solder the precut wire matching sections in place as shown. Solder balun leads to wire matching sections, and balun jacket to connector assembly lugs as shown.

Final Assembly

See figure 8. Assemble boom sections together and install mast clamp assembly as shown. Make sure boom assembly hardware is tightened securely.

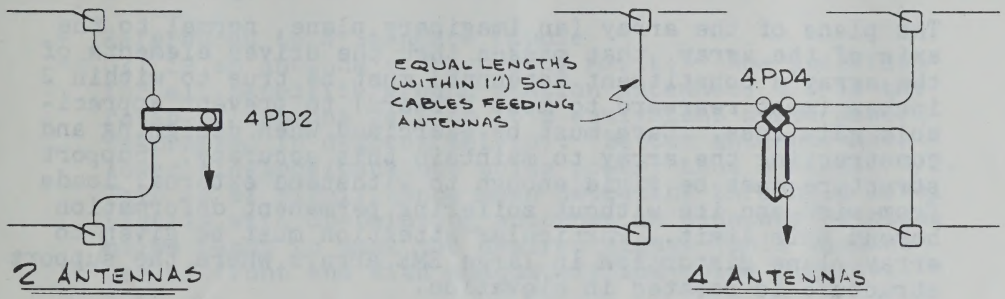
This completes assembly of your 432-19.

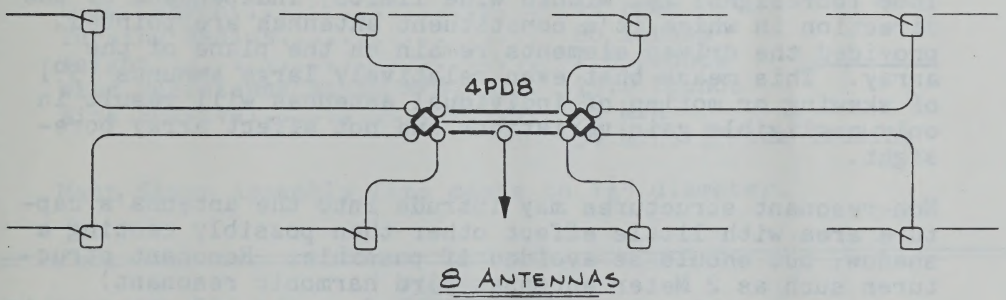
NOTE: The 432-19 driven element is ungrounded. It is recommended that the input of your receiver front end have a dc ground return to eliminate static charge build-up.

FEEDING

All antennas of an array must be properly phased. Individual antennas must be correctly oriented within the array, i.e., none mounted upside down with respect to the others (unless compensated by 180° phase shift of signal fed to it). All antennas must be fed in phase requiring feed cables to be matched in length to within 1 inch. However, cable lengths may differ by any multiple of a full wavelength in the particular cable used.* This allows length reduction of cables feeding inboard antennas of large arrays if desired.

RIW's 2, 4 and 8-way Power Dividers (models 4PD2, 4PD4 and 4PD8 respectively) provide the lowest-loss and most trouble-free method of feeding multiple antennas. Typical feed arrangements are shown below.





Alt. 8 Ant. feed: 2 4-ways fed by 2-way thru eq. lngth cables

16 Antenna feed: 2 8-ways fed by 2-way thru eq. lngth cables

Alt. 16 Ant. feed: 4 4-ways fed by 4-way thru eq. lngth cables

* Wavelength in Cable (inches)= Wavelength in Air times Cable Velocity Factor

= 11803 x V.F./ freq (MHz)

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NOTES ON ARRAYING MULTIPLE ANTENNAS

STACKING

Arrays of 2, 4, 8 or 16 antennas are the most common stacking configurations, each providing a nominal 3 dB gain over the preceding.

Suggested 432-19 vertical and horizontal stacking distance is 5½ feet which is slightly less than the antenna's capture area diameter of 6.1 feet. Spacing closer than 4½ feet will result in significant gain loss.

The plane of the array (an imaginary plane, normal to the axis of the array, that passes thru the driven elements of the array's constituent antennas) must be true to within 2 inches (most rearward to most forward) to prevent appreciable gain loss. Care must be exercised when designing and constructing the array to maintain this accuracy. Support structure must be rigid enough to withstand external loads from wind and ice without suffering permanent deformation beyond this limit. Particular attention must be given to array plane distortion in large EME arrays where the support structure is rotated in elevation.

It is interesting to note that the axis of the array main lobe (boresight) is, within wide limits, independent of the direction in which it's constituent antennas are pointed, provided the driven elements remain on the plane of the array. This means that even relatively large amounts (5°) of skewing or motion of individual antennas will result in only negligible gain variations and not affect array boresight.

Non-resonant structures may intrude into the antenna's capture area with little effect other than possibly casting a shadow, but should be avoided if possible. Resonant structures such as 2 Meter antennas (3rd harmonic resonant) should be positioned 4 feet or more from the 432 antennas to avoid possible distortion of the 432 pattern.

It must also be noted that one inescapable consequence of arraying antennas is the emergence of secondary lobes not present in the pattern of the individual antenna (and often of much greater magnitude!). This is the result of phase cancellation and reinforcement, occurs in the plane of stacking, and is primarily dependent on array configuration, not the pattern of the individual antenna. So, if your array exhibits a whopping sidelobe, don't blame it on your 432-19's!

RIW 432-19 SPECIFICATIONS

ELECTRICAL

Forward Gain	16 dBd*
First Sidelobe	-18 dB
Front-to-Back Ratio	>20 dB
VSWR	<1.2, 432 MHz
	<1.6, 426 to 438 MHz
	<2.0, 424 to 442 MHz
Beamwidth (-3dB)	24 degrees
G/T**	3 dB Sun "Y" Factor
Input Impedance	50 Ohms, Integral Balun
Connector	Type N, Weatherproof
Power Rating	1 kW CW, 2 kW P.E.P.

* Referenced to a Standard Dipole

** G/T is an antenna's "Figure of Merit." Now specified for all satellite ground station antennas, G/T is the ratio of antenna gain to it's equivalent noise power (expressed in degrees Kelvin). Better antennas have lower sidelobe/backlobe noise power, thus a higher G/T. This is of significance when detecting threshold level signals with up-pointing antennas as sidelobe/backlobe noise tends to mask the desired signal (this assumes use of front end with adequately low noise figure).

MECHANICAL

Boom Length	13 Feet
Turning Radius	86 Inches
Weight	2.8 Pounds
Wind Resistance at 80 MPH	19.8 Pounds
Wind Survival	85 MPH
	55 MPH, ½" ice loading

Mast Clamp Assembly fits masts to 1½" diameter.

PARTS LIST

ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	FWD Boom Section	13	1	Plastic Clamp
2	1	CTR Boom Section	14	1	6-32 x 1¼ Machine Screw
3	1	AFT Boom Section	15	1	#6 x ½ Self Thding Screw
4	1	Connector Assembly	16	1	#6 Lockwasher
5	1	Balun	17	1	#6 Flat Washer
6	1	Elements, set of 19	18	1	6-32 Hex Nut
7	38	Element Insulators	19	2	8-32 x 5/16 Machine Screw
8	38	Retaining Rings	20	2	8-32 x 1¼ Machine Screw
9	2	Element Clamps	21	4	#8 Lockwasher
10	2	Lugs	22	4	8-32 Hex Nut
11	1	Matching Wire, Str.	23	1	Mast Clamp Assembly
12	1	Matching Wire, Formed	24	1	Spool (assembly tool)

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BOX 191, BABYLON, N.Y. 11702

Congratulations! You have purchased the finest 432 MHz antenna available. The Tandem-Reflector* RIW 432-19 is K2RIW's latest and most advanced design. Winner of the East Coast VHF Society's 1977 Antenna Gain Contest, the RIW 432-19 is the state-of-the-art 432 antenna design.

But, state-of-the-art design does not stop with electrical performance. The mechanical design of your RIW 432-19 is all new. Elements are completely insulated from the boom to prevent the gain loss that invariably results from element detuning as corrosion-caused resistance develops at critical element-to-boom contact points in uninsulated designs. Elements are locked in place, thru-the-boom for best pattern symmetry, by a unique retention system* that eliminates bulky on-the-boom insulators that add weight and wind area. Compression type electrical connections that commonly deteriorate with time have been replaced at critical points with reliable solder connections.

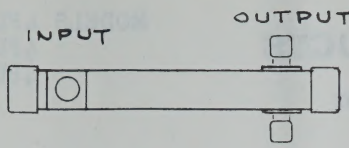
For optimum weatherability and strength-to-weight ratio, your RIW 432-19 employs only the best antenna materials; 6061-T6 aluminum, stainless steel hardware, heavy duty zinc plated steel mast clamp, Teflon insulated connector and balun, weatherproof Delrin insulators.

We feel we've done the best we can to bring you the finest antenna on the market. We will strive to do even better and would appreciate your help. When you have completed assembly of your antenna, would you complete the enclosed post paid postcard and return it to us? Doing this will also place you on our mailing list for advance notice of new products and other developments of interest to the serious upper spectrum amateur.

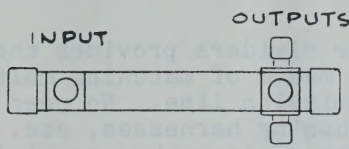
Thank you.

* Patents pending

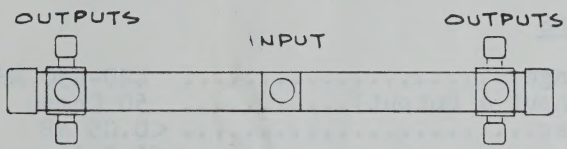
4PD2

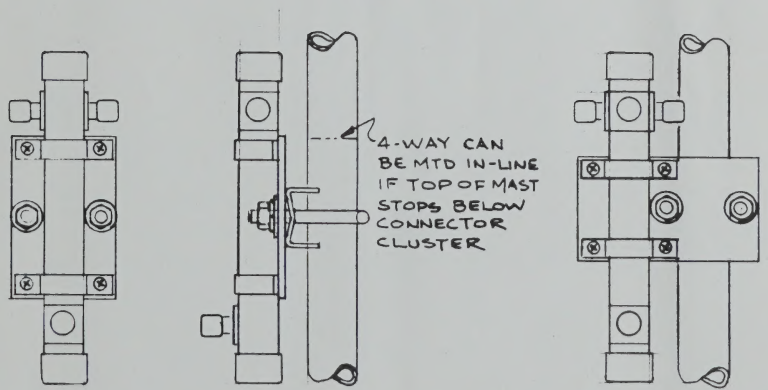


4PD4



4PD8





IN-LINE MOUNTING

FOR 2-WAY DIVIDERS

OFFSET MOUNTING

USED TO CLEAR CONNECTOR CLUSTERS ON 4 AND 8 WAY

TYPICAL MOUNTING WITH RIW ACCESSORY BRACKET PDB1

riw PRODUCTS
BOX 191, BABYLON, N.Y. 11702

MODELS 4PD2 (2-way)
4PD4 (4-way)
4PD8 (8-way)

420-450 MHz POWER DIVIDERS

The RIW 4PD Series of Power Dividers provides the lowest-loss and most trouble-free means of matching multiple antennas to a single transmission line. No need for coax barrels, tees, adapters, phasing harnesses, etc. Just feed antennas from the power divider thru equal lengths of 50 ohm cable. Simple. Economical.

SPECIFICATIONS

Frequency Range	420-450 MHz
Impedance (Input & Output)	50 Ohms
Insertion Loss	<0.05 dB
VSWR	<1.2:1
Power Rating	1kW CW, 2kW P.E.P.
Connectors	Type N

NOTE: ELEMENTS HAVE ALSO BEEN CODED AT ENDS FOR IDENTIFICATION AFTER ASSEMBLY

ELEMENT COLOR CODE

Figure 1

FWD BOOM

D16	Blu-Blu	☐
D15	Vio-Vio	☐
D14	Vio-Vio	☐
D13	Vio-Vio	☐
D12	Vio-Vio	☐
D11	Vio-Vio	☐

NOTE SMALL HOLE ON THIS END

eq length

CTR BOOM

D10	Grn-Blu	☐
D9	Grn-Grn	☐
D8	Grn-Grn	☐
D7	Red-Vio	☐

NOTE POSITION OF MAST CLAMP HOLES.

NOTE SMALL HOLE ON THIS END

AFT BOOM

D6	Red-Blu	☐
D5	Red-Red	☐
D4	Red-Grn	☐
D3	Red-Red	☐
D2	Blk-Vio	☐
D1	Blk-Blu	☐
DR	Blk-Brn	☐
R1	Blk-Red	☐
R2	Blk-Blk	☐

IMPORTANT - TO AVOID CONFUSION, IT IS RECOMMENDED THAT ELEMENTS BE CHECKED OFF AS THEY ARE INSTALLED

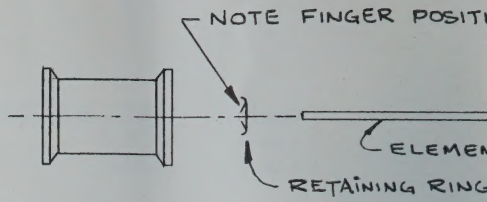


Figure 2

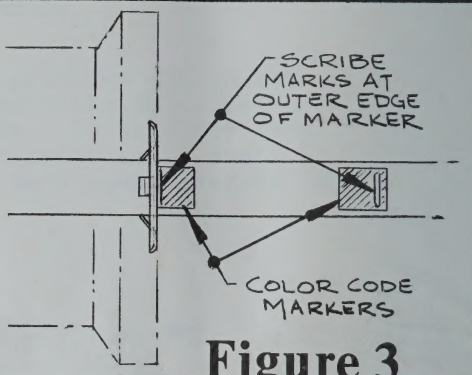
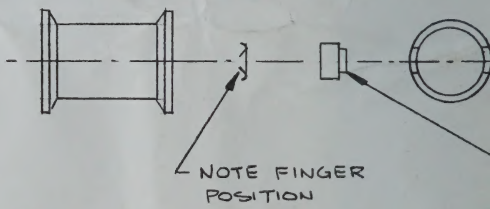


Figure 3



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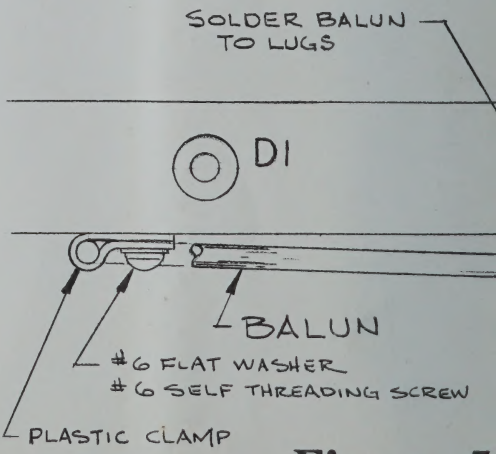

Figure 5